~~Description~~ Specification

Supply module for feeding electrical components to an automatic component-mounting machine.

Background of the Invention

The invention relates to a supply module for feeding electrical components to an automatic component-mounting machine.

Description of the Related Art

A module of this type has been disclosed e.g. by EP 0 460 834 A1, according to which the components are stored in a carrier belt that is drawn progressively through the module. In this case, the components are conveyed to a collection position under a slide which can be moved in the advancing direction. In order to prevent the components from jumping out upon jerky advancing of the belt, the slide initially covers the collection position, and releases it upon the approach of a removal tool of the automatic component-mounting machine, so that the component can be removed e.g. by means of a suction pipette. The slide is actuated by means of a lever mechanism coupled to a drive for the component belt, the slide excursion being equal to the pitch of the component belt.

Supply modules of this type are kept as narrow as possible so that the largest possible number can be arranged in the access region of the component-mounting tool. Components of different lengths can be accommodated in component belts of the same width. The belt advancing is designed such that the advancing length can be matched to the different pitches of the belt. The slide excursion must be kept large enough that even the longest components can be reliably covered.

Summary of the Invention

The invention is based on the object of simplifying the supply module with regard to the securing and release of the components. This object is achieved by means of the invention in ~~accordance with claim 1~~.

The maximum length of the components oriented in the advancing direction is considerably larger than the maximum width. The transversally deflectable locking element thus requires a smaller excursion which, moreover, may be independent of the dimensions of the component. As a result, the actuating mechanism of the locking element can be designed considerably more simply. In the case of wide components, in particular, it is possible that the locking element is narrower than the components. It is therefore advantageous if the locking element covers the center of the components at a short distance in the blocking position, in order to reliably impede the component on emplacement.

Advantageous developments of the invention are characterized in the claims 2 to 4:

The finger according to claim 2 can, for example, be mounted pivotably at its other end and be held in its blocking position by a torsion spring. A particular advantage is that the locking element can be arranged and mounted completely above the component belt. The finger can be laterally deflected e.g. by means of a simple plunger having a small excursion.

A further development according to claim 3 simplifies the locking even more. The bending spring located edgewise above the component belt can easily be deflected laterally but is sufficiently stiff in the direction perpendicular to the belt plane to absorb the small emplacement forces of the components. The locking element is anchored on the supply module only at its non-free end and requires no additionally support or guidance whatsoever.

A further development according to claim 4 combines the drive and blocking functions of the locking element in one structural part which can be actuated simply by applying an electric voltage. Such bending transducers can be

acquired inexpensively in suitable dimensions. The mechanical outlay is limited to the fixed clamping point on the supply module and to the connection of an electrical line to the electrical potentials present in the supply module.

Brief description of the drawing

The invention is explained in more detail below using an exemplary embodiment which is illustrated in the ~~drawing~~ drawings.

Figure 1 shows a diagrammatic side view of a supply module for feeding electrical components to an automatic component-mounting machine,

Figure 2 shows a plan view of the supply module according to Figure 1 with a locking element located in the blocking position,

Figure 3 shows the supply module according to Figure 2 with the locking element in an open position.

Detailed description of the preferred embodiments

According to Figures 1 and 2, a component belt 1 unwound from a reel 10 is guided through a supply module 2 at a short distance from an exterior side 3 of the supply module 2 in accordance with the dashed lines, the exterior side 3 extending in the longitudinal direction of the component belt 1 and perpendicularly to the plane thereof.

The component belt 1 has pockets 4 strung closely together in its longitudinal direction and serving for accommodating electrical components 5 that are to be supplied. The component belt 1 is drawn progressively through the supply module 2 in accordance with the pitch spacing of the pockets 4 by means of a drive 12 (~~not illustrated~~). In this case, the components 5 pass under a window 6 - open to the top - of the supply module 1, where they can be gripped by a suction pipette (~~not illustrated~~) of a component-mounting head 16 for populating printed circuit boards and be lifted out in accordance with the arrow 18 perpendicular to the component belt 1 in Figure 1. The advancing direction of the component belt 1 is indicated by the horizontal arrow 20

There is arranged above the supply path of the component belt 1 a locking element 7 after the manner of a leaf spring clamped at one end, which spring extends in the central plane of the components 5 along the supply path and the material plane of which spring is perpendicular to the plane of the component belt 1. The free end of the locking element 7 projects from the supply direction into the window 6 to an extent such that it is located centrally above the component 5 which is situated therein and which is ready for removal. As a result, this exposed component 5 is prevented from changing its collection position upon jerky advancing of the component belt 1. The locking element 7 is designed as a piezoelectric bending transducer whose other end is clamped in a fixed bearing 8 of the supply module 2. The locking element 7 extends rectilinearly in the inactivated state.

In the region of the fixed bearing 8, electrical lines 9 are connected to the piezoceramic locking element 7. When a voltage is applied from a control 22 to the control 22 the locking element 7 is deflected laterally as shown in Figure 3 to an extent such that it releases the component 5 which is ready for removal, which component is then lifted out of the pocket 4 of the component belt 1 in accordance with the vertical arrow in Figure 1. The applied voltage is then switched off, whereupon the locking element 7 springs back to its starting position and projects above the subsequent component.

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